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The following information is derived from the documents submitted by the applicant

54 Device for moving the forks on a stacker truck

57 A device for moving the forks of stacker trucks comprises a generally rectangular frame with side posts (31) and transverse bars (32, 33). The frame comprises a holder (36) for mounting on a stacker truck and a first horizontal guide (34) for inserting laterally displaceable forks (15). The interior of the frame contains a system for the mirror-image movement of the forks along the first guide (34). Included in the system for the mirror-image movement of the forks are a pair of end pieces (11) which are removably mounted on the side posts (31) of the rectangular frame. The end pieces (11) carry a second horizontal guide (12) on which two carriages (14) can be moved. Each of the carriages comprises, on the side, a vertical piece of the fork (15) inserted into the first guide (34). Between the end pieces (11) and the carriages (14) are control elements (19) for the mirror-image movement of the carriages (14) along the guide 12).

[Diagram]

Abstract

The invention refers to a fork carrying device for a stacker truck, for instance a device for the lateral movement or adjustment of forks and for the mechanical adjustment of the axial spacing between the forks.

In machines for moving loads, in particular loads on pallets, fork carrying devices are widely used which permit the forks to travel in a lateral direction in order to keep the load balanced. There are also fork carrying devices which permit further work processes such as tilting the forks, extending the forks, etc. These functions are generally achieved by means of individual devices which can be mounted on the stacker truck according to the particular requirements.

A further work process which is frequently carried out is changing the axial spacing of the forks in order to adapt them to the various positions and dimensions of the engagement openings of the pallets or loads in general.

In order to avoid repeated manual adjustments by the operator to the spacing of the forks, adjustment devices were created, including motor-driven systems for lateral travel of the forks as well as for changing their spacing. However, the design of these devices is fairly complicated and require quite a lot of space. Furthermore, the adjustment of the spacing is exclusively connected with the other function provided by the device (lateral travel or tilting of the forks, etc.), without any adaptability during the work process.

US patent 4.902.190 shows a fork adjustment device in which a system for the adjustment of the fork spacing comprises a frame in the form of an inverse U which must be mounted to a system for lateral travel by being placed on it by inserting it from above. The total weight resulting from mounting this frame is, however, such that it reduces the carrying power of the stacker truck. Furthermore, the form of the additional frame arranged outside the frame of the travel system reduces the operator's field of view considerably, particularly in the area of the upper part of the device.

The invention is based on the technical problem of removing the aforementioned disadvantages.

In order to provide a solution, in a device for moving stacker truck forks with a generally rectangular frame with side posts and transverse bars, the frame having a holder for mounting it on a stacker truck and a first horizontal guide for the insertion of forks able to be moved in a lateral direction and in whose interior are arranged systems for the mirror-image movement of the forks along the first guide, according to the invention the systems for the mirror-image movement of the forks have a pair of end pieces which are removably mounted on the side posts of the rectangular frame, and the end pieces have a second horizontal guide on which two carriages can be displaced, each of which laterally encircles a vertical piece of a fork inserted into the first guide, and arranged between the end pieces and the carriage are control elements for the mirror-image movement of the carriages along the guide.

The invention creates a fork carrying device with an auxiliary device for the concurrent and mirror-image movement of the forks on a stacker truck in a direction that changes its fork spacing. In addition, the invention provides an auxiliary device for mirror-image movement which can be mounted on a fork carrying device (travel, tilting and extension device) which is mounted on the stacker truck and whose design is extremely simple and requires no changes to the overall dimensions of the basic fork-carrying device, so that the operator has a very good field of view.

In order to clarify the concept of the invention and its advantages compared to the state of the art, one embodiment is described below using the attached drawings.

Fig. 1 shows a perspective view of a device according to the invention for the mirror-image movement of the stacker truck forks.

Fig. 2 shows a front view of the device according to Fig. 1.

Fig. 3 shows a perspective view of a frame for the lateral movement of the forks.

Fig. 4 shows a front view of the device according to **Fig. 1** which is mounted on the frame of **Fig. 3**.

Fig. 5 shows a section V-V of **Fig. 2**.

Fig. 6 shows a section VI-VI of **Fig. 4.**

According to Figures 1 and 2, an auxiliary device **10** contains a pair of lateral end pieces or head pieces **11** for the concurrent lateral movement of the forks of a stacker truck in opposing directions which are connected by a horizontal transverse bar **12** which, in turn, forms a slideway for the runners **13** of a pair of carrier elements or carrier carriages **14** for the respective forks **15**. The carriages **14** are horizontally moveable closer or further away from each other in order to change the fork spacing. The limit of travel of the carrier elements **14** in **Fig. 4** is shown extended as broken lines.

The forks **15**, which are shown in an intermediate position in **Fig. 2**, are only partially shown and in a dot-and-dash pattern, since they could belong to any state-of-the-art type used on stacker trucks.

The trunk of a hydraulic cylinder **16** is fastened to one of the lateral head pieces **11** by one of its ends, whereas its piston rod **18** is fixed to the carrier element **14** on the opposite side.

A chain **19** between the respective pinion gears or chain wheels **20** which are rotatably positioned on the end pieces, links the two carriages **14** in order to achieve the concurrency of the symmetrical mirror-image movement.

Each of the carrier elements and each of the carriages **14** comprises a pair of vertical arms or rods **21, 22** which accordingly encircle the sides of the forks **15** and are connected to each other on the rear side by the respective runner **13** and a transverse rod **23** in such a way that they essentially form a horizontal U for accommodating the forks. Advantageously, one of the arms **21, 22** is movable in a lateral direction in order to adapt the device to the width of the forks being used (for instance to two different widths).

The connections between the chain and the carrier elements and carriages **14** can be adjustable in order to set the limit of travel of the two carriages **14** and to set the tension of the chain. In the embodiment that is shown, the chain is divided into two sections, and the aforementioned connections consist of, on the one hand, threaded bolts **24** which,

according to **Fig. 6**, are fastened to parts **25, 25'** of each carriage **14** and, on the other hand, consist of brackets which are fastened to a runner **13** and a transverse rod **23**. In this way, the two chain strands, both of which extend between the two carriages **14**, are defined by a deflection around a chain wheel or pinion **20** in an intermediate position.

The device **10** also comprises a central support **26** serving as a holder and carrier for hydraulic hoses **27** which are connected to the cylinder **16**. The central support **26** is provided with a fastening hook **28** on top.

According to Figures **1** and **5**, the central support **26** is provided with a part **29** on its rear side through which the piston rod **18** of the cylinder **16** can slide horizontally.

Fig. 3 shows a well known fork carrying device **30**, for instance a system solely for the synchronous travel of the forks in a lateral direction relative to the stacker truck.

This device **30** comprises a generally rectangular frame which is made up of side posts **31**, an upper transverse bar **32** and a lower transverse bar **33**. The upper transverse bar forms a seat **34** which serves as a guide in which the upper hooks **35** of the forks are normally arranged and along which the forks are moveable.

On its rear side, the upper transverse bar **32** has a carrying system **36** for suspension on a stacker truck according to the state of the art. An actuator **37** permits the frame to travel in relation to the carrying system so that a lateral movement of the forks occurs in relation to the stacker truck.

Positioning of the device **10** on the fork carrying device **30** is very simple and quick since all that is required is that the device be inserted into the interior of the frame of the fork carrying device by inserting the central support **26** into the middle of the seat **34** and tightening the lateral bolts **38** for fastening the head pieces **11** on the inside of the respective side posts **31** of the frame of the fork carrying device **30**. Because the lower ends of the central support **26** and the arms **21, 22** rest on the frame of the fork carrying device **30**, a potential pivoting movement of the parts around the guide **12** is prevented.

Advantageously, at the lower end of the central support **26**, a tappet **39** may be provided which can be inserted into an appropriate seat of the frame of the fork carrying device in order to prevent potential lateral movement of the central support.

It is, therefore, clear that the auxiliary device according to the invention can, as required, at any time be easily mounted on the fork carrying frame.

This can, for instance, be handy if one initially decides to mount only the frame for lateral travel of the forks and then later wishes to have the additional function of motor-driven spacing control for the forks.

The omission of a carrying frame or a support or counter frame in the auxiliary device for the mirror-image fork movement permits a particularly lightweight design, and neither the thickness or the horizontal and vertical dimensions of the fork carrying device **30** are increased. The remaining carrying force of the stacker truck and the operator's field of view are not significantly changed. The thickness of the central support **26** and the carrier arms **21, 22** can easily be less than the thickness of the forks **15** or just as great as that of the forks which are always present on the fork carrying device **30**, whereas all the functional parts of the auxiliary device **10** are contained in the interior of the outside profile of the fork carrying device.

As described, the auxiliary device **10** has a sufficiently self-contained design to be handled as a part separate from the fork carrying device, the latter, however, being used as a carrying frame during operation.

In this way, it is possible to have a light, inexpensive and strong auxiliary device.

The auxiliary device **10** shown here in conjunction with a fork carrying device **30** can, if required, be mounted on other types of fork carrying devices such as tipping equipment and fork extension equipment and thus has a high degree of versatility.

Furthermore, the system for moving the carrier arms **21, 22** can be different from what was shown here.

Claims

1. A device for moving stacker truck forks, with a generally rectangular frame with side posts (31) and transverse bars (32, 33), the frame having a holder (36) for mounting it on a stacker truck and a first horizontal guide (34) for the insertion of forks (15) able to be moved in a lateral direction and in whose interior are arranged systems for the mirror-image movement of the forks along the first guide (34), **characterized in that** the systems for the mirror-image movement of the forks have a pair of end pieces (11) which are removably mounted on the side posts (31) of the rectangular frame, and the end pieces (11) have a second horizontal guide (12) on which two carriages (14) can be displaced, each of which laterally encircles a vertical piece of a fork (15) inserted into the first guide (34), and arranged between the end pieces (11) and the carriages (14) are control elements (19) for the mirror-image movement of the carriages (14) along the guide (12).

2. Device according to Claim 1, characterized in that a chain (19) moving around a pair of chain wheels (20) belongs to the drive elements, each wheel being carried by an end piece (11), the chain (19) between the chain wheels (20) having two strands parallel to the second guide (12), one strand being attached to one carriage (14) and the other strand to the other carriage (14), thus forcing a mirror-image movement of the carriages, and an actuator (16) being arranged between one carriage (14) and one of the end pieces (11) for moving the carriage along the second guide (12).

3. Device according to Claim 2, characterized in that the chain (19) is interrupted in the area of each carriage (14) and forms two segments whose ends are fastened to the carriages by means of adjustment systems (24) for adjusting the length of the chain strands.

4. Device according to Claim 2, characterized in that the chain (19) runs below the second guide (12).

5. Device according to Claim 2, characterized in that the actuator (**16**) is arranged between the two chain strands (**19**).

6. Device according to Claim 2, characterized in that a central support (**26**) is provided which stretches between the first guide (**34**) and the actuator (**16**) and contains the pipes (**27**) for supplying the actuator, the central support (**26**) having an opening in which the piston rod (**18**) slides.

7. Device according to Claim 6, characterized in that the central support (**26**) is provided with a hook (**28**) on the top for inserting in the first guide (**34**) and extends downward to a lower transverse bar (**33**) of the frame in order to permit insertion into this transverse bar.

8. Device according to Claim 1, characterized in that a pair of horizontal transverse rods (**13, 23**) and a pair of vertical rods (**21, 22**) belong to each of the carriages (**14**), the upper transverse rod (**13**) containing a runner which slides on the second guide (**12**) and both the vertical rods (**21, 22**) projecting towards the forks (**15**) and thus forming lateral encircling elements for the forks.

9. Device according to Claim 8, characterized in that at least one vertical rod (**22**) on each carriage (**14**) is displaceable on the associated transverse rods (**13, 23**) in order to change the spacing between the two rods (**21, 22**) of each carriage.

10. Auxiliary device for the mirror-image movement of forks (**15**) on a stacker truck, the auxiliary device (**10**) being inserted into a frame of a fork carrying system (**30**) which has a first guide (**34**) for the insertion and lateral sliding of forks on a stacker truck, characterized in that a pair of lateral end pieces (**11**) are provided for mounting the auxiliary device (**10**) on the aforementioned frame, the end pieces (**11**) accommodating a second horizontal guide (**12**) on which two carriages are displaceable and which both have systems (**21, 22**) which accordingly laterally encircle a vertical piece of a fork mounted on the supporting frame, and in that, between the end pieces (**11**) and the carriages (**14**), drive elements (**19**) for the mirror-image movement of the carriages along the second guide (**12**) are incorporated.

11. Auxiliary device according to Claim 10, characterized in that a chain (**19**) moving around a pair of chain wheels (**20**) belongs to the drive elements, each wheel being carried by an end piece (**11**), the chain (**19**) having two strands that are located between the chain wheels (**20**) and are parallel to the second guide (**12**), one strand being attached to one carriage and the other strand to the other carriage, thus forcing a mirror-image movement of the carriages (**14**), and an actuator (**16**) being arranged between one carriage (**14**) and one of the end pieces (**11**) for moving the carriage along the second guide (**12**).

12. Auxiliary device according to Claim 11, characterized in that a central support (**26**) is provided in a vertical direction which contains the pipes (**27**) for supplying the actuator, the central support (**26**) having an opening for accommodating the sliding piston rod (**18**) as well as mounting systems (**28**) for mounting on the supporting frame.

Attached are 3 pages of drawings

DRAWINGS, PAGE 1

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Fig. 1

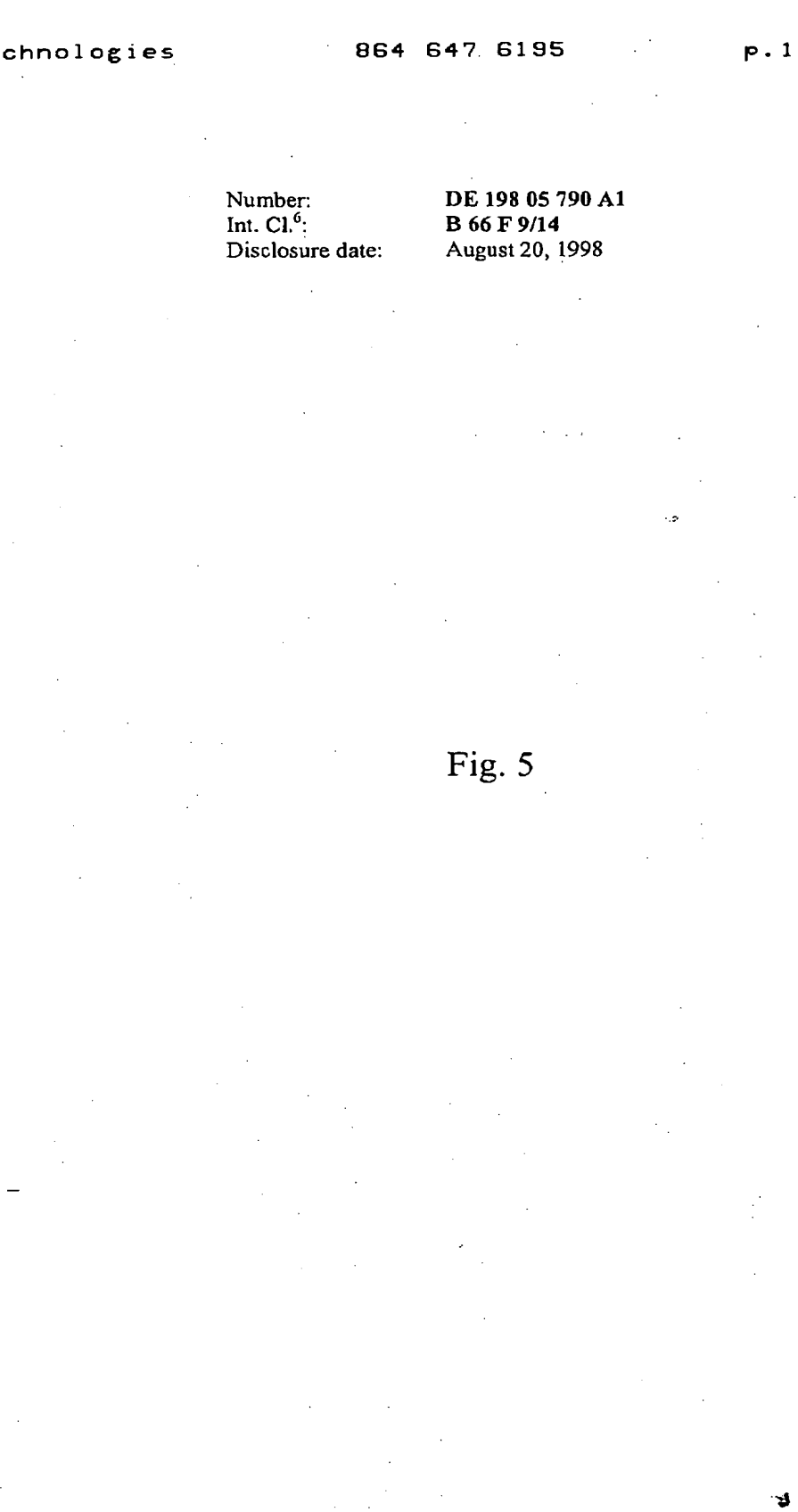

Fig. 5

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Fig. 2

Fig. 6

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Fig. 3

Fig. 4

ZEICHNUNGEN SEITE 1

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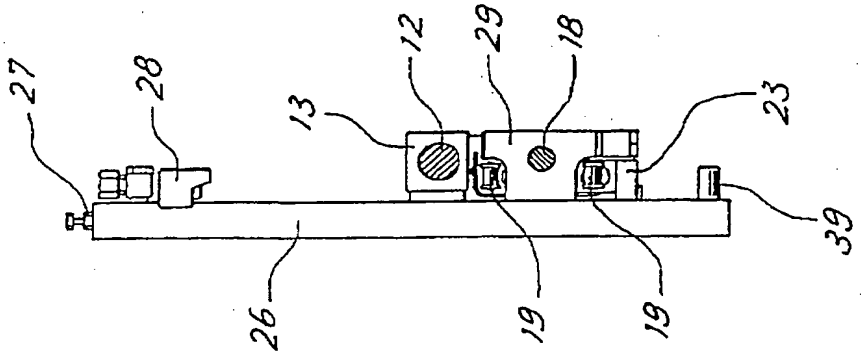

Fig. 5

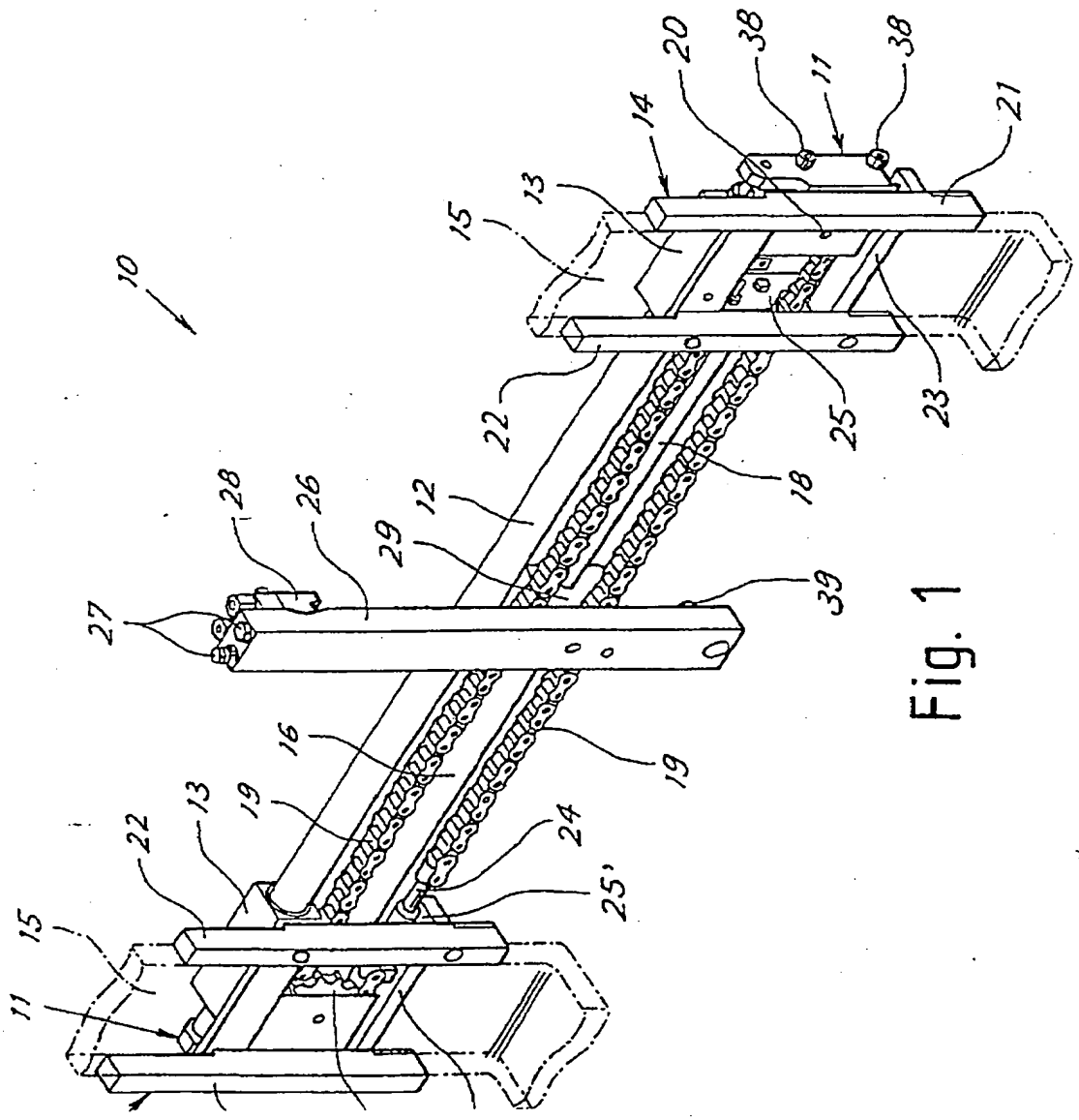

Fig. 1

ZEICHNUNGEN SEITE 3

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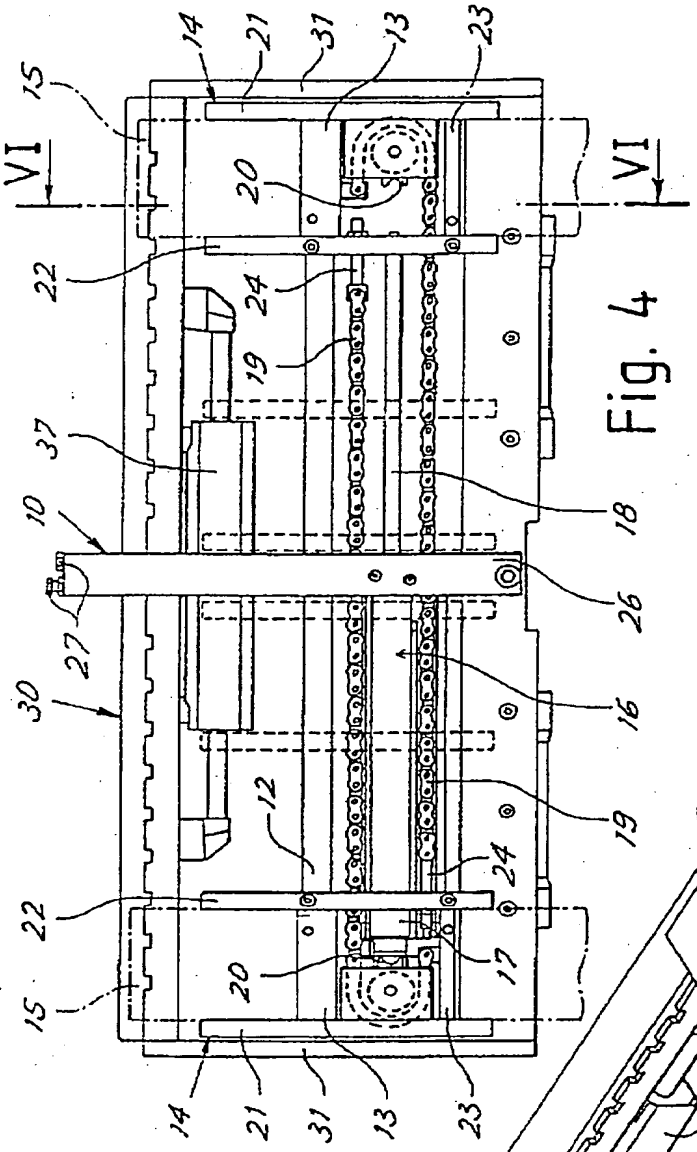

Fig. 4

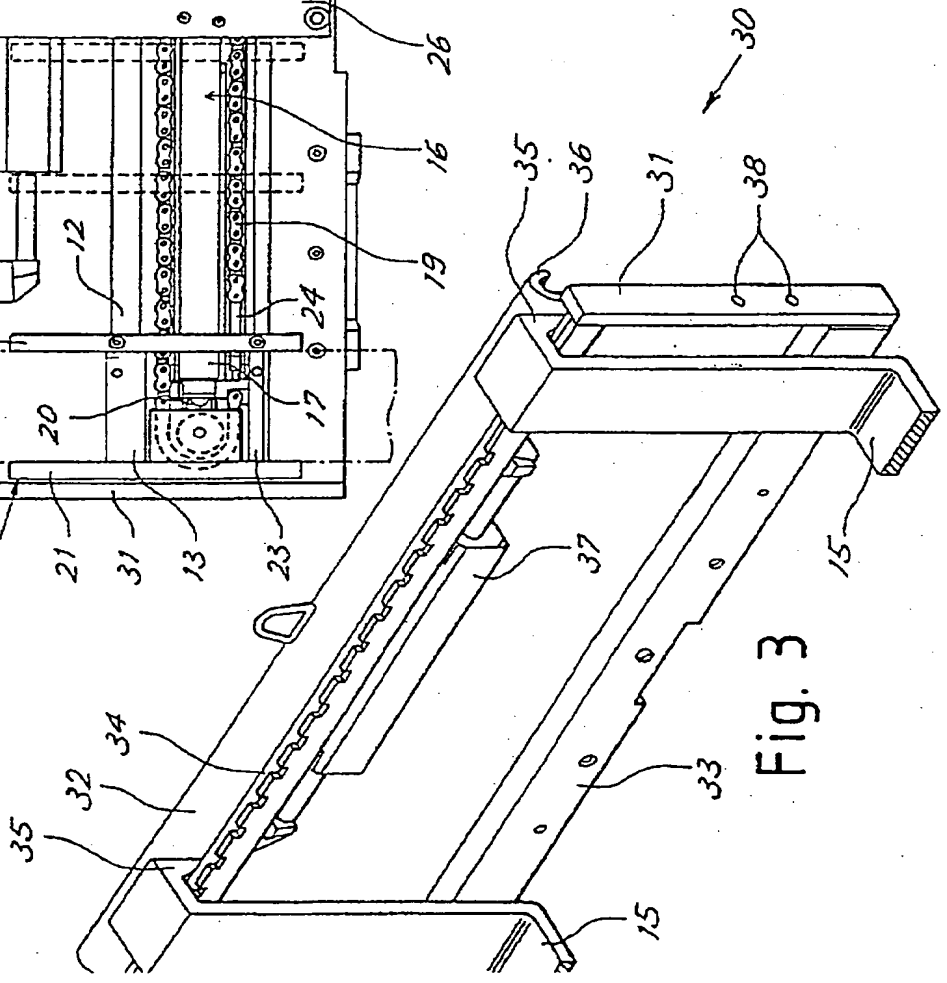

Fig. 3

ZEICHNUNGEN SEITE 2

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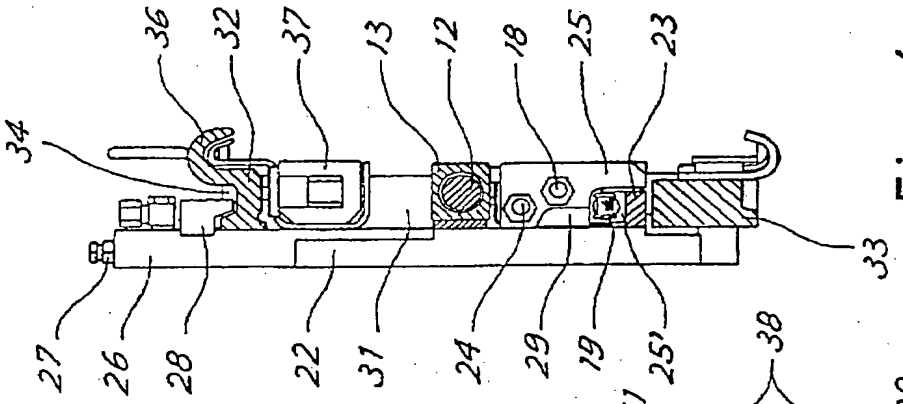

Fig. 6

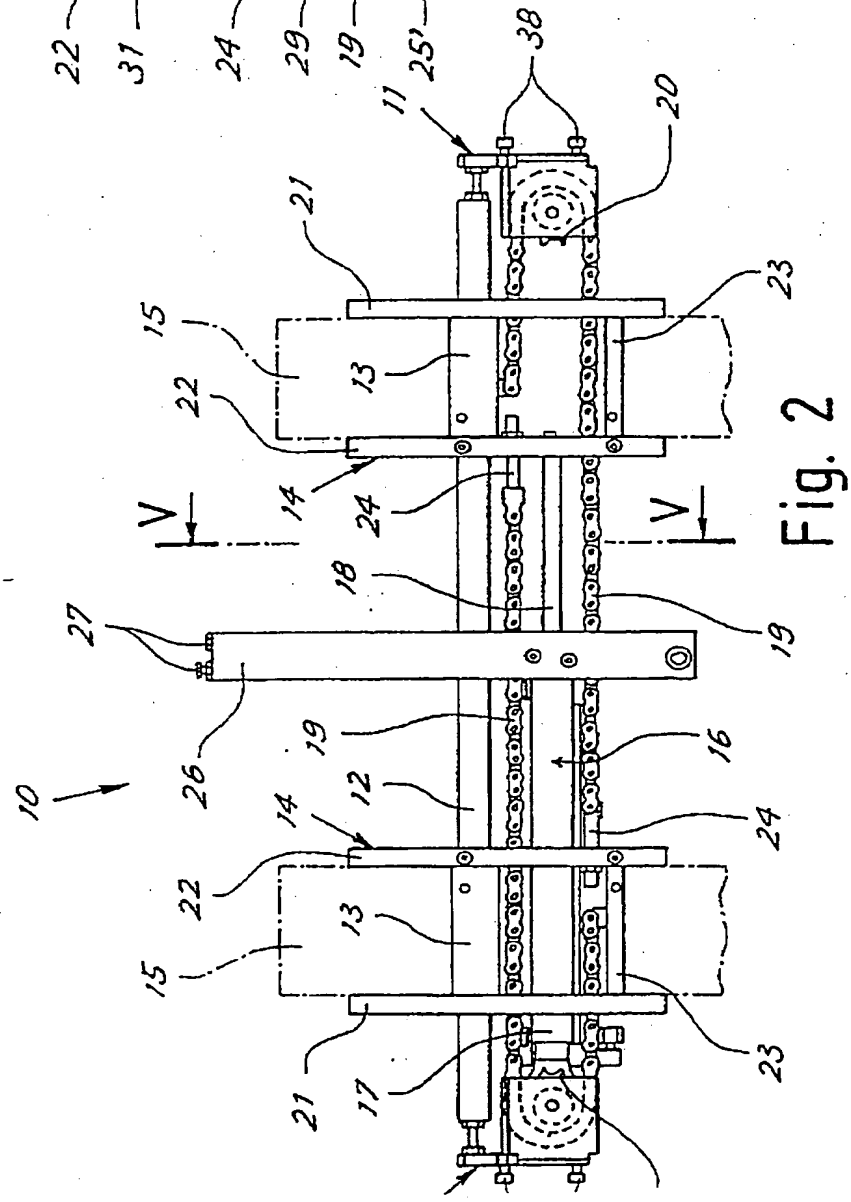

Fig. 2